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CITY PLANNING TECHNIQUES

By Russell H. Riley, M. ASCE

CITY PLANNING AND AIR TRANSPORT DIVISIONS

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AMERICAN SOCIETY OF CIVIL ENGINEERS

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PAPERS

CITY PLANNING TECHNIQUES

BY RUSSELL H. RILEY,¹ M. ASCE

SYNOPSIS

The growth and development of cities, if properly planned, involve long and careful study by laymen and engineers working with city officials. This paper describes and evaluates some of the procedures followed in preparing a city plan, and provides a general description of the most desirable method. Particular stress is placed on the roles of the engineer and of the private citizen.

INTRODUCTION

A complete study of city planning techniques is difficult because more than a thousand American cities have prepared city plans or are engaged in city planning activities. It is impossible, therefore, to be completely familiar with all the different practices and procedures. However, the writer has had the privilege of assisting in the preparation of many city plans and of studying many others—experiences affording a fair cross section of information on current planning practices. Some of the following comments may seem critical of certain procedures; however, they are presented in an effort to show both advantages and defects.

CITY PLANNING COMPARED WITH OTHER PHASES OF ENGINEERING

Before discussing the different practices or techniques of city planning, it is desirable to recognize a major difference that exists between usual engineering practice and city planning. This difference is people—the relationship of the program to the public. In designing and supervising a sewer system or water system, a power plant, dam, or similar projects, the engineer is normally responsible to a small committee or to a few officials, and the public has little interest in the plan or its details unless there are long delays during construction, or unless defects develop soon after completion. The situation is different in city planning. Each phase of the plan affects some or all of the property within the city. Property owners protest vigorously when a major street is

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proposed to traverse a residential district, or when a grade-separation structure disturbs access to a commercial building. Even a recommendation to change a bus route may bring forth much opposition. However, public reaction is particularly widespread in regard to zoning. The state enabling acts facilitate the opportunity to protest—and properly so—since they require duly advertised public hearings before zoning and other phases of the plan can be adopted or amended. Planning techniques and practices should be such that they will keep public opposition to a minimum.

MAJOR TYPES OF PLANNING TECHNIQUES

With so many cities engaged in planning, there are countless combinations of practices used in preparing a comprehensive city plan. The dominant techniques, however, can be grouped into three major classifications, which are summarized as follows:

Planning by Citizens and Inexperienced Technicians.—Although many suburban communities and smaller towns—of 50,000 population and less—have engaged experienced technicians to prepare their city plans and zoning ordinances, many others have attempted to have the work done by citizens' committees assisted by local city officials or by a young graduate from a technical school. The failure of the legislative body to appropriate adequate funds for planning purposes is a major cause of this practice.

The work is usually initiated with considerable enthusiasm, the first step being the acquisition of a number of plans and ordinances from other cities of similar size. These are studied to determine which parts would be applicable to the local community. Efforts are made to combine selected parts of several plans into a plan for the local city and, as might be expected, large gaps or missing sections frequently result. A few field inspections are usually made, but, for the most part, the citizens rely on their memory of existing conditions.

After many hours of meetings, enthusiasm begins to wane, and a long period usually elapses before any plan is presented for public consideration and comment. Even the public comment may be very critical since it is layman's opinion against layman's opinion.

Any defects in this practice or technique are certainly not the fault of the citizen planners. They give far more time and effort than should be required in any civic endeavor. It is unreasonable to expect citizens engaged in their own personal business to spend so much time on unfamiliar technical details. Citizens play an important part in any planning program, but it should be primarily in judging the proposals rather than in making them.

Furthermore, the local officials are usually too busy with their normal duties to devote much time to handling the routine details of preparing a plan. As a result, sufficient time is not given to considering existing conditions and probable future requirements. The basic defect, however, is the lack of technical experience and background.

Compilation of Data Followed by Incomplete Planning.—A second type of planning technique sometimes followed, even in large cities having relatively large staffs, involves the devoting of almost all efforts to the compilation of data regarding existing conditions and trends. Such information is necessary

as the basis for a plan, but it has only limited value unless the plan is actually prepared.

Routine administrative duties admittedly absorb much of the time of the average planning staff. This is particularly true of the time required for enforcement of subdivision regulations and for making zoning changes and revisions (almost all the larger cities have zoning ordinances, even though they may be the only existing part of a city plan). Almost all state enabling legislation providing for city planning, however, clearly states that the major duty of a plan commission is to prepare and adopt a comprehensive plan. Such legislation further provides for changes and amendments in the plan. Thus, there should be a comprehensive plan and it should be continuously adjusted to unexpected changes in conditions and trends. This responsibility for preparing a plan should be delegated to a group or committee of any local staff, rather than having the staff devote its entire efforts to routine administration or compilation of mere facts—interesting as the latter may be. If the staff cannot be augmented, outside technical assistance should be secured to prepare the plan and participate in its revisions.

A variation of the foregoing technique is the preparation of one or two phases of a comprehensive plan, usually a major street plan or possibly a plan for a grouping of public buildings. In numerous instances, the study or plan may be only for an individual project that is contemplated for early construction, rather than for a system of such facilities serving the entire urban area. This partial planning should produce certain beneficial results, but its potentialities are limited in comparison with those of a comprehensive plan. In some cities, these "piecemeal" plans receive little or no publicity, and few persons other than the plan commission and some officials are familiar with the proposals. This procedure may prevent public objection or criticism, but it hinders attempts by individuals or corporations to adjust their improvements to a long-range plan.

One large midwestern city had been engaged in a planning program for more than ten years. Vast amounts of data had been compiled—some of which was becoming obsolete—but a complete plan, or even a major section thereof, had never been prepared and submitted to the public. As a result, the commission was beginning to receive so much criticism from both citizens and officials that its standing and prestige were impaired. This commission finally engaged a planning firm to prepare such parts of a comprehensive plan as could be developed from its existing data. The partial plan was prepared within a few months, and received considerable newspaper publicity. A much more favorable attitude developed toward the commission and its work; in fact, the legislative bodies have since provided additional funds to complete the comprehensive plan.

A Complete Plan Based on Engineering Principles.—The third major type of planning technique is the one most commonly used in modern programs. The procedures involved are generally the same as those observed in studying and designing other engineering projects. New Orleans, La., has completed a comprehensive revision of its original city plan, which was prepared in the late 1920's. The program required approximately 3 years, during which the

local staff compiled the data and did the drafting, and the consultants furnished two experienced planners. In addition, frequent visits were made by members of the firm to direct the work, to decide on recommendations, and to discuss the findings and proposals with the commission, officials, and citizens.

Before starting preliminary studies and plans for the average engineering project, it is necessary to spend considerable time in determining the dominant requirements and major physical and economic characteristics of the proposed project. Similar investigations, probably of a more intensive nature, are necessary in the initial phases of a city planning program. Topographical, climatological, and geological characteristics frequently exert a major influence on the type of city and on its physical requirements. For example, the low, level topography has been a major factor in influencing the character of development found in New Orleans. The difficulties of storm-water disposal, caused by the topography and periods of heavy rainfall, and the high costs of foundations and footings (required because of local soil conditions) have resulted in such high land-improvement costs that land use is much more intensive than in many other cities of comparable size. For example, there were only 4.63 acres of developed land per 100 persons in New Orleans (1950), as opposed to 6.11 acres for the same number of persons in eleven other cities of comparable size. In New Orleans, the residential lots are narrow, and 2-family houses and multiple-dwelling structures are much more dominant than in similar cities—particularly those in the midwest and in the south. The high land cost and the intensive use of land, together with the comparable lack of vacant property (except in the extreme outlying sections), have also resulted in small school grounds and in few neighborhood parks. Many other cities have particular characteristics which affect the recommendations and proposals comprising a satisfactory plan.

Another major study that should be made in determining the background and future requirements of city planning is an analysis of employment opportunities and conditions that have influenced the growth of the particular city. In New Orleans, the harbor and water transportation facilities exerted the major influence on its early growth. Not only did they facilitate the establishment and development of commerce and industry, but they were, and have continued to be, a major source of employment. This fact clearly reveals that the plan for this city must provide amply for the expansion of ports and other modern forms of transportation. During World War II, the city experienced a tremendous increase in industrial development, a trend which continued after the war's end. Accordingly, there has been a need for providing large tracts of land that can be made available for industrial expansion. Of particular importance is the fact that the industrial growth has provided a wider and more balanced economic diversification. This indicates excellent possibilities for employment and continued growth.

The second step in the study of the average engineering project is the determination of its size and future requirements. The same is true of a city planning program. The major objective of the city plan is to provide more efficient and adequate physical facilities for present and future citizens. Careful studies of population growth and development are essential, therefore, in

order that data be available as to how many citizens will reside within the area during the next 25 or 30 years.

The first phase of the population study is an analysis of past trends and factors influencing growth, and the preparation of estimates as to the size of the probable future population. Some unexpected conditions may affect the population estimates, but for the most part, there can be reasonable approximations. The second phase requires a careful study as to where this future population should, and probably will, be located. Without these data, it is impracticable to decide the location and size of the future physical facilities—such as major streets, schools, parks, sewers, and drainage facilities—for most effective service to the future citizens.

Several different factors, including existing land uses, trends in building development, and topography affect distribution of population. For example, in the New Orleans area, some sections of the vacant and undeveloped property were found to be 6 ft or more below sea level. Other large unimproved sections of the city had elevations only slightly above sea level. Improvement of the low areas, with particular regard to facilities for disposing of the storm water, would be expensive. Therefore, the population should be encouraged to settle in the areas that can be most economically developed.

One further factor that should be mentioned in connection with population studies is that much of the future distribution probably will occur beyond present corporate limits; the area that should be considered in a planning program is an urban area that may be much larger than the city's incorporated area.

Just as an engineer or architect, after having determined the size of a building, must next decide upon the arrangement of its various portions or rooms, so the next step in normal city planning practice is to determine the general location and extent of the major land-use areas. These areas include those for single-family and two-family residences, multiple dwellings, commercial structures, and the various types of industries. Past experience has indicated that each use functions much more efficiently when it is near other similar uses and not when widespread intermingling occurs. Arrangement and control of land uses in city planning are known as zoning, and all too frequently have been considered as the dominant or sole phase of planning.

Preparation of a land-use plan and zoning ordinance involves most careful study and consideration of existing conditions and probable future needs. A field survey to determine the location and extent of existing land uses is imperative. Of particular interest to engineers is the fact that studies have revealed a close relationship between land-use areas and units of population. This relationship is usually expressed in acres of land use per 100 persons. For example, in New Orleans, the land-use survey (1950) revealed an average of 0.14 acre of commercial development per 100 persons and an average of 0.31 acre of industrial development per 100 persons. A study of a large number of land-use surveys reveals a marked similarity of ratio between land use and population in different communities of similar size. Some such surveys have also been made at intervals of 20 or 25 years in the same cities, and very minor changes in the ratio were noted during the intervening periods.

The land-use ratios provide a sound basis, therefore, for determining the areas that will be required for the various uses, especially since these ratios can be related to the estimates of future population. A zoning ordinance can thus provide for adequate land uses on a sound engineering basis, rather than on individual opinions or guesses. Admittedly, the average zoning ordinance provides a greater area for industry, commerce, and (usually) for multiple dwellings than the land-use computations indicate as being needed. The major reason for this apparent lack of balance is that the existing development is usually so scattered that the districts must be larger than would normally be necessary. Zoning can and should, however, be based on sound engineering standards and principles—just as is the design of a sewer or water system.

After the determination of the extent of population, and the location and extent of the land-use areas necessary for this population, the next step in New Orleans was to determine the location, character, and extent of the public physical improvements required to serve these areas in accordance with modern standards. The physical facilities normally considered in the modern city plan are the following: Major streets; street and off-street parking facilities; public schools; public parks and recreation facilities; transportation facilities, including rail, water, air, and truck transportation; transit facilities (streetcars, trolley coaches, and buses); public buildings; and housing. It will be noted that, with the possible exception of housing and some of the transit and transportation facilities, all the foregoing are the responsibility of public agencies or are under some type of public control and regulation. Even private housing is affected by public controls and has a definite relation to the public welfare.

In the average city, and certainly in a city as large as New Orleans, a special study and report is made on each of these major physical facilities comprising the comprehensive plan. Furthermore, in making this study and in determining the recommendations regarding their future location, extent, and character, the most careful consideration is given to existing facilities, modern standards, and probable future requirements. In the major street study, it is possible to estimate the volume of traffic which will originate in major sections of the city, how much will originate in or be destined for areas beyond the city, and where the major objectives will be within the urban area. The future capacities of the entire street system can be determined, and the proposed individual improvements related thereto. Similarly, careful estimates can be made for future school enrollments and, when adjusted to modern standards, the school and park system can be planned in close relationship to future requirements.

In city planning, just as in many other engineering projects, it is frequently impossible to meet recognized and desirable standards completely. Fixed conditions are usually the major obstacles. The application of sound technical judgment can, nonetheless, result in a workable and satisfactory solution. For example, the computations and standards might indicate the need for a major street accommodating three lanes of moving traffic in each direction during the peak period of traffic movement. Existing streets in the area to be served have a right of way of only 70 ft, and the frontage is so completely occupied with expensive structures that any widening of this right of way would be

financially prohibitive. A logical and practicable solution might be to widen the pavement to only 58 ft, prohibiting parking on the side of the street that carries the dominant traffic movement during the peak hours. Another possibility may be two one-way streets. There are undoubtedly many opportunities to expedite traffic flow through traffic control and public education, rather than through expensive improvement projects.

The practice and procedures as well as the standards to be followed in planning have been mentioned in regard to only a few of the several physical improvements. The same general policies should be followed in planning for the other facilities, and several instances will probably be encountered in which some readjustments will be necessary in the preliminary recommendations as additional phases are considered. One of the fundamental advantages of planning is providing for the proper relationship between the several parts of the city design. Such coordination should begin as the plan is being prepared.

Preparation and even the adoption of the best city plan can insure satisfactory results only if the plan is followed consistently. One of the most effective means of securing adherence to the plan is the preparation of a 5-year or 10-year public works program after all other phases of the planning program have been completed. This work program involves a selection of those physical improvements which the studies revealed as being most seriously needed, and which would result in maximum benefits to the population. Preliminary estimates also should be made of the cost of these improvements, followed by an analysis of the financial status and potentialities of the several public agencies to be responsible for the projects. The number and type of projects selected for construction each year can thus be closely adjusted to available funds; no serious tax burden should result at any one time.

RELATIONSHIP OF THE PLANNING PROGRAM TO CITIZENS

Throughout this paper, emphasis has been placed upon the close relationship that exists—or should exist—between the city plan and the citizens. The fact that city planning is an engineering science has also been stressed. It may seem inconsistent that laymen can force changes in a city plan that is based upon sound facts and proven engineering principles. Ability to do so remains a proven fact. Furthermore, this condition will continue under the present (and desirable) form of government in the United States. What steps can be taken to improve the situation?

Two measures seem to offer major potentialities. One is to encourage the use of citizen committees to advise with the planning commission concerning the preliminary reports or any changes or adjustments in any part of the plan after it is officially adopted. The fact that the total membership of such citizens' committees will represent only a small percentage of the total population can be partly offset if the membership comprises prominent leaders representing all the varied community interests. Use of citizens' committees not only acquaints more persons with the need and advantages of the plan, but also it gives other citizens a feeling that their interests are being protected.

The second measure is to follow procedures used by business organizations, and to engage experienced public relations personnel as a part of the planning

staff. It has always been the writer's belief that members of the technical profession have limited ability in public relations—primarily because their training and experience are of such a specialized nature. Many people now agree that the weakest part of planning is not the preparation of a good plan, but the means of making the general public familiar with the plan and with its advantages. It is only logical that a part of the planning program be handled by a personnel staff able to secure widespread public understanding and support, since these can be so beneficial. The cost would be small in comparison with the potential advantages.

SUMMARY

City planning has made marked progress in its scope and practice since the early 1920's. Although many more subjects have been included in later studies than were in those made earlier, the basic fact remains that city planning is primarily concerned with the physical facilities of urban areas. Even though a sound plan includes consideration of economic and social characteristics as well as of financial problems in carrying out the plan, studies of the physical facilities comprise the major work of the modern planning program.

Members of the civil engineering profession are from their experience and training eminently qualified to deal with these physical facilities and some have helped to develop many sound practices and techniques. This paper has emphasized the fact that, although several different practices and techniques are used in preparing a plan, the best results can be obtained only when the same sound procedures are followed as are required in any other phase of civil engineering. There is no reason why the engineer cannot play a most important part in improving city planning techniques and practices in the future, and in formulating even sounder and more complete plans than have been prepared in the past.

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